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Nutritional Status of Participating and Non-participating Pupils in the Ghana School Feeding Programme

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Abstract

The Ghana Demographic Health Survey indicates that the major nutritional challenges in Ghana among school children are protein-energy malnutrition and micro-nutrient deficiencies. School Feeding Programmes are one of the main interventions addressing malnutrition and its related effects on children's health and education. The purpose of this study was to assess the influence of Ghana School Feeding Programme on nutritional status of school children in Atwima-Nwabiagya District of Ashanti Region, Ghana. A total of 234 pupils between 9 and 17 years of age, comprising 114 participants and 120 non-participants from three participating and three non-participating schools, respectively, with similar characteristics, took part in the study. It was hypothesized that the nutritional status of participants was better than that of non-participants. Results did not indicate any association between the school lunch and nutritional status. There was no statistically significant difference in the nutritional status of participants and non-participants. The programme did not impact the nutritional status of participants.

Keyword: School Feeding Programmes, Ghana School Feeding Programme, nutritional status, participants, non-participants

1. Introduction

Good nutrition is essential throughout life for good health and development and therefore an inadequate access to this may result in malnutrition. Malnutrition continues to be a worldwide problem and plays an important role in the health and welfare of individuals. It may result in morbidity, poor academic performance and fewer opportunities for economic development (Wardlaw & Kessel, 2002). According to the Food and Agriculture Organization of the United Nations (FAO, 2005), there were about 850 million people worldwide who were malnourished between 1999 and 2005 and the worst affected were children. In Africa, the problem of child malnutrition is more prevalent than elsewhere in the world as more than half malnutrition-related deaths occur in sub-Saharan Africa (Neumann, 1999).

The Ghana Demographic Health Survey (1998) indicated that the major nutritional challenges in Ghana among children of school-going age are protein-energy malnutrition and micro-nutrient deficiencies. The report further established that the incidence of stunting, underweight and wasting among children of school-going age were 26%, 25% and 10% respectively. The Ghana Demographic Health Survey (2003) also reported that 30% of children of school-going age were stunted and 11% were severely stunted. Malnutrition in children is known to adversely affect their cognitive and mental development. Therefore, access to good nutrition, both at home and through the educational system, is essential and would contribute to the elimination of malnutrition and all its associated health and developmental problems (Ohene-Afoakwa, 2003).

School Feeding Programmes (SFPs) are one of the main interventions used to address the eradication of hunger and falls squarely within the ambit of the UN declaration and at least three of the Millennium Development Goals (MDGs). These goals include the eradication of poverty, hunger and universal primary education. School feeding has its origins in the 1930s, when schemes were introduced in the United Kingdom (UK) and the United States of America (USA) with the explicit aim of improving the growth of children (WFP, WHO and UNESCO,

1996). Later in South Africa in 1940, school feeding started by supplying free milk to schools. Since then, school feeding has broadened to include the provision of fortified biscuits, nutrient supplementation or full meals in both developed and developing nations. School feeding programmes were traditionally conceived as nutritional interventions aimed at improving nutritional status, measured primarily through increments in height and weight (WFP, WHO & UNESCO, 1996).

In Ghana, the SFP first started in October 2005 with 10 pilot schools, each drawn from one of the ten regions of the country. The basic concept of the GSFP is to provide children in public basic schools one hot nutritious meal per day, using locally grown foodstuffs. The long term objective of the programme is to contribute to poverty reduction and food security in Ghana, while the immediate objective is to reduce hunger and malnutrition, boost domestic food production and increase school enrolment, attendance and retention (Government of Ghana, 2006). After its introduction in 2005 in ten schools, the GSFP, as of August 2006, had been expanded to cover 200 schools involving 69 000 pupils in all the 138 districts nationwide. As of April 2007, the programme had been extended to 975 schools, covering 408 989 pupils nationwide (Nuako, 2007).

Over two years of its institution, empirical evidence is needed to establish the contribution of the GSFP to the nutritional status of beneficiaries. There is also the need to assess the quality of the diet given to participating pupils to help set appropriate standards for all meals. This study, therefore, sought to determine the nutritional quality of meals served to pupils in participating schools and also to compare the nutritional status of participating and non-participating pupils in the GSFP in Atwima-Nwabiagya District of Ashanti Region of Ghana, to establish the nutritional benefits to beneficiaries.

2. Methodology

2.1 Study Location

The study was conducted in the Atwima-Nwabiagya District in the Ashanti Region of Ghana. The district lies approximately on latitude $6^{o}75$'N and between longitude $1^{o}45$' and $2^{o}00$' W. It covers an estimated area of 294.84 km^2. The 2000 National Population Census indicated that the district had a total population of 129 275 with an annual growth rate of 3 percent (Atwima-Nwabiagya District Assembly, 2004). Atwima-Nwabiagya district was chosen purposively out of the twenty-one political districts in Ashanti Region from a list obtained from the Regional Secretariat of the GSFP. The district was chosen because it is one of the few districts in the region in which the programme was first introduced. The district has about 79 public primary schools and of this number eight (8) were participating in the GSFP at the time of the study. Out of the 8 participating schools in the GSFP, three (3) were randomly selected as study sites. Three schools were selected out of the remaining 71 non-participating schools as a comparison group using simple random sampling technique.

2.2 Study Population, Sample Size and Sampling Procedure

The population for the study constituted all pupils in the three schools participating in the programme as well as the other 3 non-participating schools, A total sample size of 234 pupils was used for the study according to Sarantakos (1993) for both groups. All study participants were in Class 5 and this grade was chosen for convenience. In selecting the pupils the class register was used and simple random sampling where every 3rd child was selected. Thus, a total of 114 and 120 pupils for participating and non-participating, respectively, were recruited to participate in the study.

2.3 Data Collection Instruments and Procedures

Permission to conduct the study was sought from the District Education Office. The head teachers of the various schools then requested parents of the study children to give their consent for their wards to be involved in the study. Pupils whose parents declined their participation were replaced. Additionally, verbal consent was sought from all pupils before the study begun. A pretested questionnaire was used to solicit information on socio-demographic characteristics and food consumption patterns. Anthropometric measurements taken were weight, to the nearest 0.1 kg using an electronic bathroom scale of 150 kg capacity, and height, to the nearest 0.1 cm with a Microtoise stadiometer. For dietary assessment, weighed food intake record and 24-hour recall were employed. Data were collected between 13th May and 11th June 2008 from the selected schools and covered all the five school days during break hours and after classes.

2.4 Data Analysis

The questionnaire data were edited, hand-coded and analysed using the Statistical Package for Social Sciences (SPSS/PC, version 16) software to generate frequencies and percentage distributions and means. Weights of the portions of the meals provided to participating pupils obtained with the weighed food intake record were converted into grams for the analyses of energy and other nutrients. The ESHA Food Processor Nutrient

Database (FPRO, Version 6.02) was used for the analyses of energy and nutrients and the quantities derived were compared with the FAO Recommended Nutrient Intakes to determine the extent to which the meals met or deviated from the nutrient needs of the pupils. Analysis of variance was used to assess if significant differences existed in the means of energy and nutrients intakes from the school meals of the three participating schools. Anthropometric measures were used to determine nutritional status of the children using weight-for-age, height-for-age and weight-for-height indices. The WHO/Epi Info (Version 3.4.1) software was used in generating the standard deviation scores for HAZ and WAZ from the weight and height measurements of the pupils to determine those who were stunted and/or underweight. Using the WHO/Epi Info (Version 3.4.1), the WHO growth reference data for 5-19 years was employed to compute standard deviation scores for BMI-for-age which was used in assessing thinness among pupils. The study assessed nutritional status using the WHO's cut-off points for classifying malnutrition. The chi-squared statistic was used to test the null hypothesis to ascertain the significance of the relationship between the nutritional status of the participating and non-participating pupils. The level of significance was set at 5% for all the analyses.

3. Results and Discussion

3.1 Socio-demographic Characteristics

The ages of the study pupils ranged from 9 to 17 years. The 1987 Education Reforms in Ghana stipulated the primary school age between 6 -13 years. The mean age of the participants was 13 years and that of the non-participants was 12 years. The observed ages of about 40% of the pupils in Class 5 were outside the primary school range and this is because the cohort came from a pure rural setting and in such places some children start school when they were much older. Also, as a result of the government of Ghana's initiative to enrol all children in school and to provide at least one meal a day in schools most of the children who were not in school and have out grown primary school are now found in the rural community schools. The Institute of Food Research Programmes reported that with delay start in schooling and repeated grades, many children in primary schools in developing countries have already reached adolescence (DFID, 2008). The mean household size of the participants (6.13 ±2.01) was slightly higher than that of the non-participants (5.72 ± 2.49). Sixty-two percent (62%) of the participant's household members were below 18 years, 30% adults were engaged in some form of occupation and the pupils ate four times daily. On the other hand, 63% of the household members of the non-participants were below 18 years, 32% were working and pupils ate three times daily. Having more dependants to cater for may reduce household per capita calorie intake since there are many persons to share a plate of food (Bronte-Tinkew & Dejong, 2003). The 24-hour recall showed that the types of meal eaten by both groups were the same which might be due to their similar socio-economic characteristics. A little over half of the pupils (51.3%) were under the care of both parents, 21.8% were living with their mothers, 6% with their fathers and the rest with other relatives. Generally, there were more female caregivers (179) than males (55) which may be attributed to the fact that, traditionally, women bear the responsibility of raising children. On the whole, trading and farming dominated the occupations of caregivers and this is consistent with the 2003 Ghana Health and Demographic Report which established that the predominant occupations of the labour force in the district were agriculture and petty-trading (Ghana Statistical Services, 2003). From such an occupation profile, it is evident that pupils were from families that were not very well financially.

3.2 Nutritional Status of Pupils

The weights, heights and BMIs of participants and non-participants are compared in Table 1. Table 1 shows no significant differences ($p > 0.05$) between the mean weights and BMIs of the participants and non-participants of the Ghana School Feeding Programme. However, pupils differed significantly with regard to their heights ($p < 0.05$). Pupils in participating schools were slightly taller than the non-participants. This could be explained probably by the higher ages of some of the participating pupils (15-17 years).

Table 1. Comparison of weights, heights and BMIs of participants and non- participants

Measurements	Participants		Non-participants		p-value
	Mean	±SD	Mean	±SD	
Height (cm)	147.4	8.9	144.6	8.6	0.016
Weight (kg)	37.5	7.8	36.7	8.2	0.470
BMI (kg/m^2)	17.1	1.9	17.4	2.6	0.286

The means and standard deviations of the anthropometric indicators used in assessing nutritional status (WAZ, HAZ and BMI-for-age) of participants and non-participants are presented in Table 2. In Table 2, it is observed that no significant differences ($p>0.05$) existed in the mean Z-scores of HAZ, WAZ and BMI-for-age of participants and non-participants. Therefore, the provision of lunch did not seem to make any difference in the growth indices of participants and non-participants. The mean WAZ and BMI-for-age standard deviation scores of both participants and non-participants corresponded to normal values while for HAZ, the scores of participants and non-participants corresponded to normal values and mild stunting, respectively.

Table 2. Means and standard deviations of HAZ, WAZ and BMI-for-age scores of participants and non-participants

Indices	Participants		Non-participants		p-value
	Mean	±SD	Mean	±SD	
HAZ	-0.9	0.1	-1.0	0.1	0.425
WAZ	-0.9	0.1	-0.9	0.1	0.480
BMI-for-age	1.2	0.6	1.2	0.7	0.633

The prevalence of stunting among participants and non-participants is shown in Table 3. Over fifty percent of the participants were of normal height for their ages while slightly over 40% of the non-participants had normal heights for their ages. No pupil from either group was severely stunted. A chi-squared test conducted to assess differences between the height-for-age indices between participants and non-participants showed no significant differences in the level of stunting ($X^2 = 2.205$, $p>0.05$). However, mild to moderate stunting was slightly higher among the non-participants than among participants. Stunting represents the long term effect of malnutrition in an individual or population and does not vary according to recent dietary intakes. According to the Administrative Committee on Co-ordination/ Standing Committee on Nutrition (ACC/SCN, 2005), stunting affected an estimated 32.5% of children in developing countries. The incidence of stunting in this study sample was higher since results in Table 3 revealed that, generally over 50% of all the pupils exhibited various degrees of stunting (mild-moderate). It could then be inferred that chronic malnutrition was present in the school-age children of this study.

Table 3. Comparison of the prevalence of stunting among participants and non- participants

Stunting	Participants		Non-participants		Total	
	N	**%**	**N**	**%**	**N**	**%**
Normal	60	52.6	52	43.4	112	47.8
Mildly Stunted	37	32.5	49	40.8	86	36.8
Moderately Stunted	17	14.9	19	15.8	36	15.4
Severely Stunted	0	0.0	0	0.0	0	0.0
Total	114	100.0	120	100.0	234	100.0

The chronic malnutrition observed in the participating and non-participating pupils of this study could be due to their usual inadequate food intakes. Gibson (2005) pointed out that stunting results from extended periods of inadequate food intake, poor dietary quality and increased morbidity. The high level of stunting among both study groups is enough reason for the need for effective school feeding. Probably, had there been a baseline data before the initiation of the GSFP, the results here could have represented modest improvements in the reduction of stunting since the incidence was lower among participants than among non-participants. However, since stunting is a long term indication of malnutrition, a longer period of feeding would be needed to effect changes.

Table 4 presents the distribution of underweight among participants and non-participants. It shows that slightly more than half of the pupils from non-participating schools were normal (55%) while no pupil was severely underweight. Among the participating pupils, approximately 52% (fewer than non-participants) were normal whereas no pupil was severely underweight.

Table 4. Comparison of the prevalence of underweight among participants and non-participants

Underweight	Participants		Non-participants		Total	
	N	**%**	**N**	**%**	**N**	**%**
Normal	59	51.8	66	55.0	125	53.0
Mildly underweight	41	36.0	42	35.0	83	35.5
Moderately underweight	14	12.2	12	10.0	26	11.5
Severely underweight	0	0.0	0	0.0	0	0.0
Total	114	100.0	120	100.0	234	100

A chi-squared test revealed no significant differences between the percentages of pupils who were underweight in both participating and non-participating schools at a five percent level of significance ($X^2 = 186$, p = 0.930). The school lunch thus seemed to have made no difference in the weight-for-age index for the beneficiaries of the GSFP.

In Kenya, Foeken et al. (2007) conducted a study on school farming and school feeding and reported similar findings. Their results indicated that school feeding could not improve the nutritional status of the participants as no significant differences existed in the percentage of children who were underweight in participating and non-participating schools.

The prevalence of underweight in the total study sample (47%) was lower compared to the percentage of those who were stunted (52.2%). The lower prevalence of underweight compared to stunting is consistent with the report of the Administrative Committee on Co-ordination/ Standing Committee on Nutrition (ACC/SCN, 2005) which indicated that underweight affects fewer children globally than stunting. The high prevalence could be due to the fact that, stunting is a cumulative process and therefore, the proportion of stunted children increases with age.

The prevalence of thinness and overweight/obesity among participants and non-participants is given in Table 5. The prevalence of thinness indicates that almost 90% of both participants and non-participants had a normal BMI for their ages. More participants were normal (91.2%) compared to the non-participants (88.9%). However, there was no significant difference ($X^2 = 6.26$, p = 0.181) in the prevalence of thinness among participants and non-participants.

Table 5. Prevalence of thinness and overweight/obesity of participants and non-participants

Obesity/Thinness	Participants		Non-participants		Total	
	N	**%**	**N**	**%**	**N**	**%**
Normal	104	91.2	106	88.4	210	89.6
Overweight	5	4.4	6	5.0	11	4.7
Obesity	0	0.0	5	4.2	5	2.3
Thin	5	4.4	3	2.4	8	3.4
Severely Thin	0	0.0	0	0.0	0	0.0
Total	114	100.0	120	100.0	234	100.0

It was hypothesised in the study that the nutritional status of participating pupils was better than that of the non-participating pupils. In Table 6, the chi-square analysis conducted to determine the significant differences in the prevalence of stunting, underweight and thinness which was the basis for assessing disparity in nutritional status of participating and non-participating pupils did not establish any statistical significant differences at the 5% significance level. Therefore, the lunch provided to the participants did not make any significant difference in their nutritional status unlike in the study conducted in Kenya by Musamali et al. (2007) which showed a positive association between school lunch and the nutritional status of participants.

Table 6. Results of chi-square test of nutritional status of participants and non-participants

Anthropometric Indicators	χ^2	df	p-value
Stunting (HAZ)	3.123	3	0.373
Underweight (WAZ)	1.303	3	0.728
Thinness (BMI-for-age)	7.247	4	0.123

3.3 Energy and Nutrients Provided by School Meals over a Period of One Week

The results of the study showed that the types of meals served to the pupils in all the three participating schools were about the same. In meal planning, variety is an important issue that must be considered to enhance the nutritional composition of the meals prepared since a varied diet tends to supply most nutrients (Honere et al., 2007). Basically, the common food items used in preparing the meals over the week included polished rice, cassava in the form of dough and grits, corn dough, beans, groundnut and the usual vegetables such as tomato, pepper, onions for sauces and soup. The average weekly mean intakes of energy and nutrients from the school meals in the three schools are presented in Table 7. Analysis of variance was used to assess significant differences in the mean intakes of energy and nutrients from the school meals served in the three participating schools. The weekly mean intakes of energy from the meals provided in all the three schools failed to meet one-third recommended intakes (720kcal; WHO & FAO, 2004) expected from the school meals. The mean intakes ranged between 59% and 68% with an average of about 64% of the requirements. No significant differences were observed in the weekly mean intakes of energy among the three participating schools. A study by Walker et al. (1997) in Jamaica on school children's diets and participation in a school feeding programme showed that the energy intakes of participants at lunch were only about 20% of their daily energy needs. The inadequate intakes of energy by the pupils in this current study could be attributed to the small quantities of the meals served.

Table 7. Mean intakes of energy and nutrients supplied by school meals served throughout the week

Nutritional Components (*1/3 RNI*)	Mean	±SD	% of RNI met	p-value
Calories kcal (*720 kcal*)	460.4	30.1	63.9	0.007
Protein g (*14 g*)	11.4	0.9	81.4	0.000
Carbohydrates g (*43 g*)	71.6	6.3	166.5	0.005
Vitamin A ug RE (*200 ug RE*)	628.3	85.2	314.2	0.107
Thiamin mg (*0.4 mg*)	0.3	0.1	75.0	0.033
Riboflavin mg (*0.4 mg*)	0.1	0.1	25.0	0.793
Vitamin C mg (*13.3 mg*)	7.9	0.3	59.4	0.000
Iron mg (*5 mg*)	3.9	0.4	78.0	0.000
Calcium mg (*433.3 mg*)	96.7	9.4	22.3	0.000
Zinc mg (*3 mg*)	2.1	0.2	70.0	0.000

The pupils in all the three schools obtained over two-thirds of the expected intake of protein from the school lunches. The differences in the mean protein intakes among the schools were significant at 5% level of significance. The higher intakes observed in some of the schools could be attributed to the frequent use of cowpeas in their meals as opposed to the others.

Studies by Meme et al. (1998) and Musamali et al. (2007) in Kenya on the impact of school lunch programmes on nutritional status of children established that the total protein intake of pupils was adequate. In this study, there was limited use of animal products whereas animal products were the main sources of protein in the Kenyan studies. A characteristic of these meals is the use of legumes like groundnuts and cowpeas in their preparation. According to Adow et al. (1993), legumes characteristically contain relatively high amounts of protein and provide valuable substitutes to the first class proteins.

On days when rice and tomato sauce was served, protein intakes were inadequate and in most instances, this meal supplied less than 50% of the protein requirements to pupil. Whereas the staple rice was a predominantly starchy staple the quantities of protein used in the preparation of the sauce from personal observations, was very inadequate. A typical case was when 1.7kg of tinned mackerel was used in preparing a meal for over 500 pupils in one of the schools. It is therefore not surprising that the protein content of the meals was low. The small quantities of fish used could be attributed to the fact that protein-rich foods are usually expensive especially in developing countries like Ghana (Latham, 1997).

The school lunch provided excess carbohydrates to the beneficiaries in all the three schools. Needs for carbohydrates were met on all the days of the week in every school. The high intakes of carbohydrates from the school meals was because the meals provided in all the schools utilized starchy staples like rice, corn and cassava. Although the intake of carbohydrate was in excess, calorie requirements were not met. This could be because humans obtain energy not only from carbohydrates but also from fats and proteins. Therefore, inadequate intakes of any of these three nutrients negatively affect the amount of energy obtained from food.

With respect to vitamin A intakes, all the meals in the three schools supplied more than the one-third RNI requirement. The high supplies of vitamin A by the lunches could be because palm oil was commonly used. On days when bean stew was served, usually on Tuesdays and Fridays, vitamin A intakes were very high (more than six times of what was required). Palm oil is rich in carotenoids and tends to be more affordable. Palm oil is known to provide most of the vitamin A activity in the diets of economically deprived populations (WHO & FAO, 2004).

The mean weekly intake of thiamin was 0.3mg in all the schools and this corresponded to 75% of the RNI required from the school lunch. The use of cowpeas in meals explains the high intakes of thiamin as they are excellent source of thiamin in human diet (Latham, 1997; Pamplona-Roger, 2005).

Results in Table 7 also show that mean intakes of riboflavin was the lowest among all the nutrients considered in this study. The mean intake in each of the three schools was 0.1mg, which corresponded to 25% of the expected RNI. Cereals like rice and maize, which were served at least three times in the weekly menus of all the three schools, are excellent sources of riboflavin in human nutrition and one would have expected the school meals to supply adequate amounts of riboflavin to the recipients. It has been reported by WHO & FAO (2004) that even though cereals are good sources of riboflavin, excessive polishing and refining remove considerable proportions of riboflavin and other B-vitamins. This could explain the low intakes of riboflavin from the school meals as in all the three schools the rice used for meal preparation was highly polished.

Vitamin C obtained from the menus of the schools was derived mainly from tomatoes (canned) and pulses (cowpea and groundnuts) and supplied about 59% of the RNI on average. Fresh fruits and vegetables were lacking in all the menus of these schools, which may explain the inadequate intakes of vitamin C by the pupils. Additionally, the low intakes of vitamin C from the school meals could be attributed to the unstable nature of this vitamin since factors like cooking methods, high temperatures, exposure to light and presence or absence of metals all affect its stability in a meal (Davies, 2002). Considering the importance of vitamin C in the absorption of non-heme iron in foods from plant origin (which was characteristic of all the menus), the utilization of fresh vegetables or provision of small amounts of fruits can help improve the bioavailability of the iron derived from the school meals to benefit the pupils.

The iron content of the school meals was adequate. The relatively high intakes could have resulted from the frequent utilization of legumes (cowpeas) and groundnuts which are rich sources of non-heme iron in the meals of these schools. According to Davies (2002), about two-thirds of iron in human diet is obtained from plant sources. Iron deficiency is the most frequent nutritional deficiency disorder in the world (WHO & FAO, 2004). There is also a strong evidence to suggest that adequate iron intake positively impact on behaviours like attention, memory and learning. Additionally, iron plays a vital role in the development of the brain as several structures of the brain have high iron content (WHO & FAO, 2004). Therefore, it is good that the meals served to the pupils had acceptable amounts of iron.

It must be emphasized that the non-heme iron derived from these meals is easily precipitated by a number of substances present in food which makes it less efficiently absorbed by the body than heme iron (Davies, 2002). Hence, the iron derived from the meals served to pupils in all the schools may be poorly absorbed unless these meals contain adequate vitamin C, which is known to improve the absorption of non-heme iron.

The calcium intakes were below the requirements in all the three participating schools. The low calcium intakes of the pupils concur with reports by Rolfes et al. (1998), that many children and adolescents unfortunately have calcium intakes below current recommendations.

Zinc requirements were not met by any of the schools but the meals in all the schools supplied at least two-thirds or more of the requirements. Whole-grain cereals, pulses and legumes are some of the foods that provide the highest concentrations of zinc (Latham, 1997; WHO & FAO, 2004) and these food groups were common in the menus of all the three participating schools of this study. Therefore, utilization of food commodities like maize, rice, cowpeas and groundnuts may account for the relatively high proportions of zinc in the school meals.

Results of the study suggest that the meals served in the three participating schools could not meet the expected energy and some nutrient intakes. However, statistically significant differences were observed in the nutritional intakes of the three participating schools.

4. Conclusion and Recommendations

From the findings of the study it was concluded that the three participating schools served about the same meals using local food stuffs. The meals served did not meet one-third of the RNIs expected from the school meals because of the insufficient quantities of meals served to the pupils and also probably due to the improper formulation of the meals. The nutritional status of participants and non-participants were not statistically different and the examination of the raw data suggests that the incidence of stunting and underweight were high among both groups. The high levels of chronic malnutrition observed was due to their usual inadequate food intakes which were low in energy and some nutrients. The nutrient intakes of both groups revealed that their needs for most nutrients were not met but statistically significant differences existed in their intakes. The participants had higher intakes for most of the nutrients and also ate more times daily than the non-participants. Results did not indicate any association between the school lunch and nutritional status. There was no statistically significant difference in the nutritional status of participating and non-participating pupils. There is the need to fortify the meals in order to improve the nutritional level. A baseline data is also recommended before all new feeding programmes begin so as to be used by future studies which intend monitoring differences in growth of the non-participants. Despite the lack of significant differences in the nutritional status of the participants and non-participants, more resources should be allocated to continue the programme because the GSFP might have played a protective role otherwise the participants could have been worse-of.

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